

Replacement Sheet

1/39

+

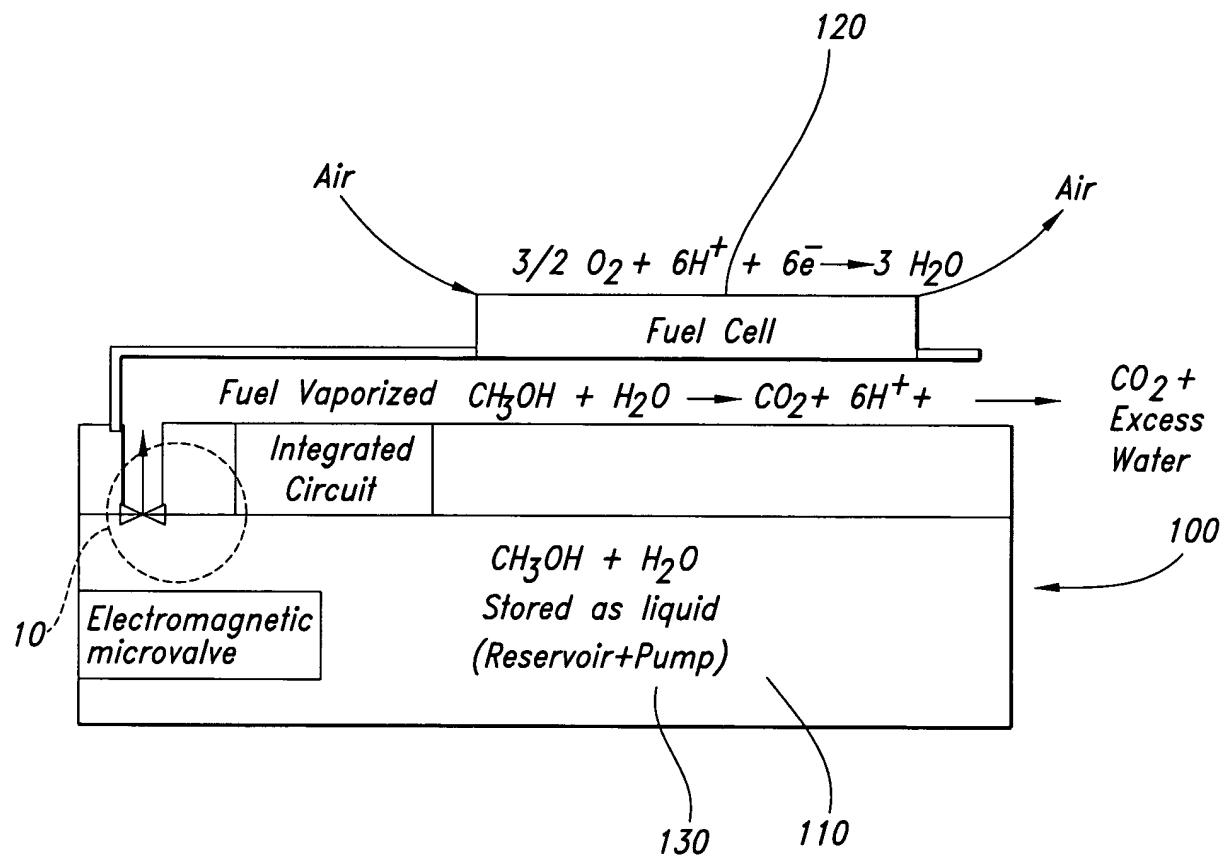


FIG. 1

+

Replacement Sheet

2/39

+

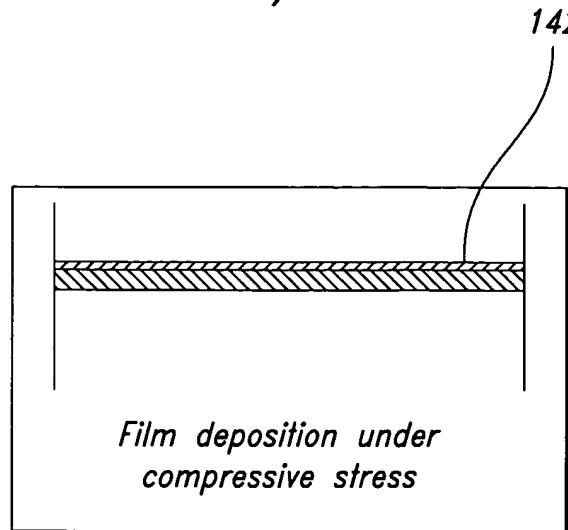


FIG. 2A

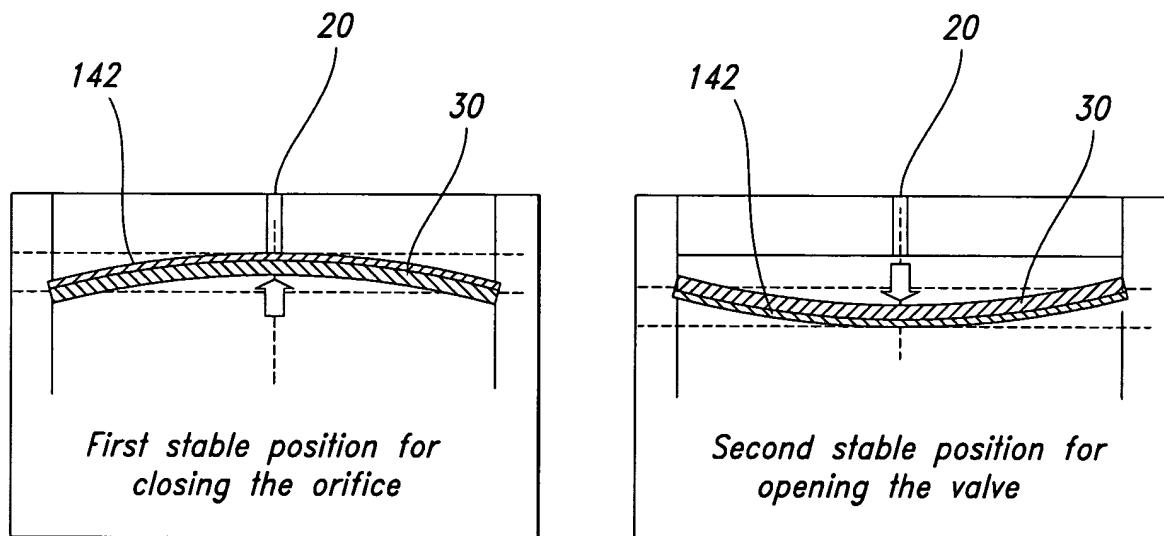


FIG. 2B

FIG. 2C

+

Replacement Sheet

3/39

+

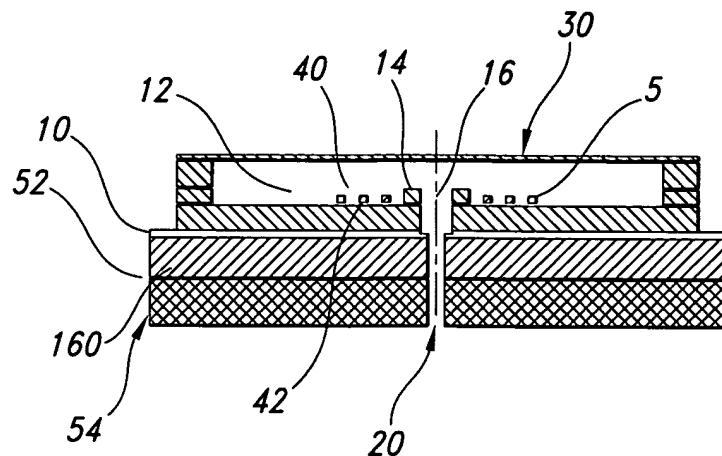


FIG. 3A

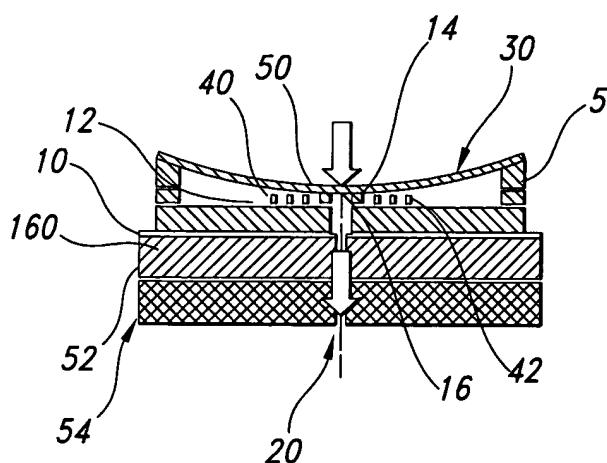


FIG. 3B

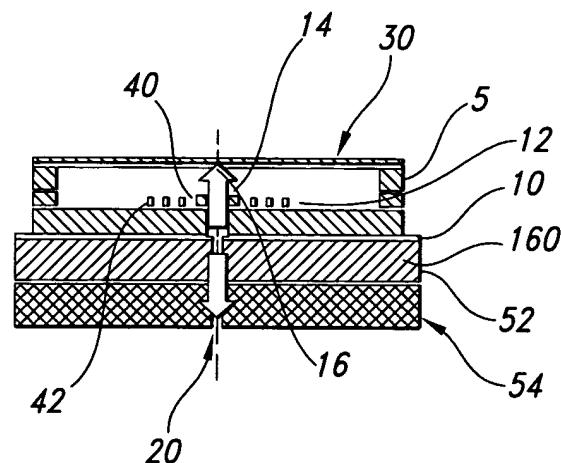


FIG. 3C

+

Replacement Sheet

+

4/39

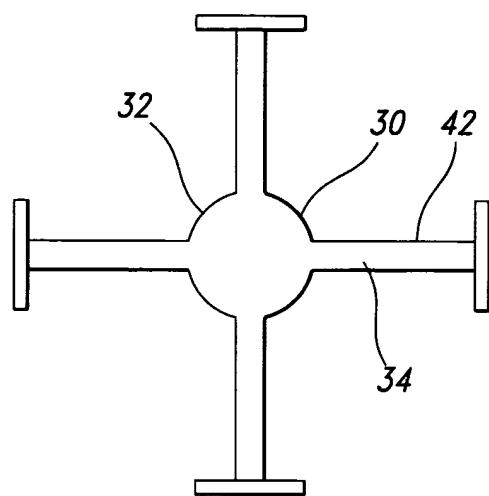


FIG. 4A

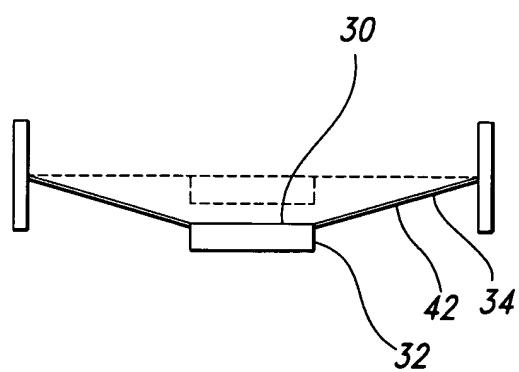


FIG. 4B

+

Replacement Sheet

+

5/39

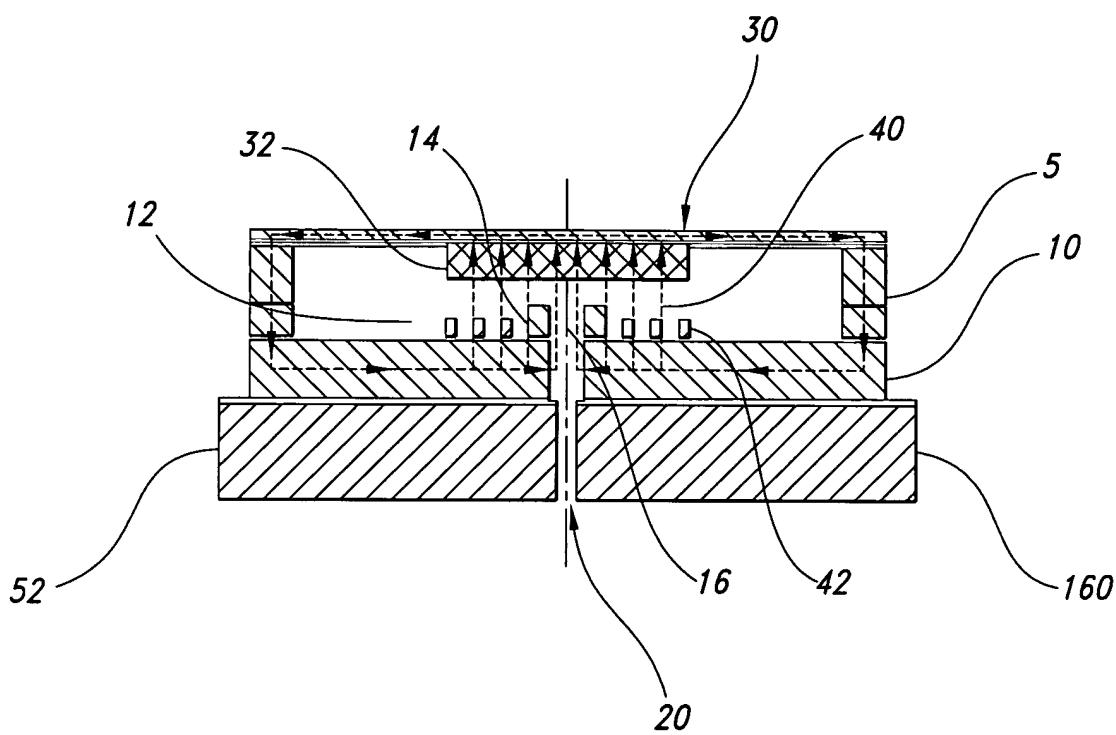


FIG. 5

+

Replacement Sheet

+

6/39

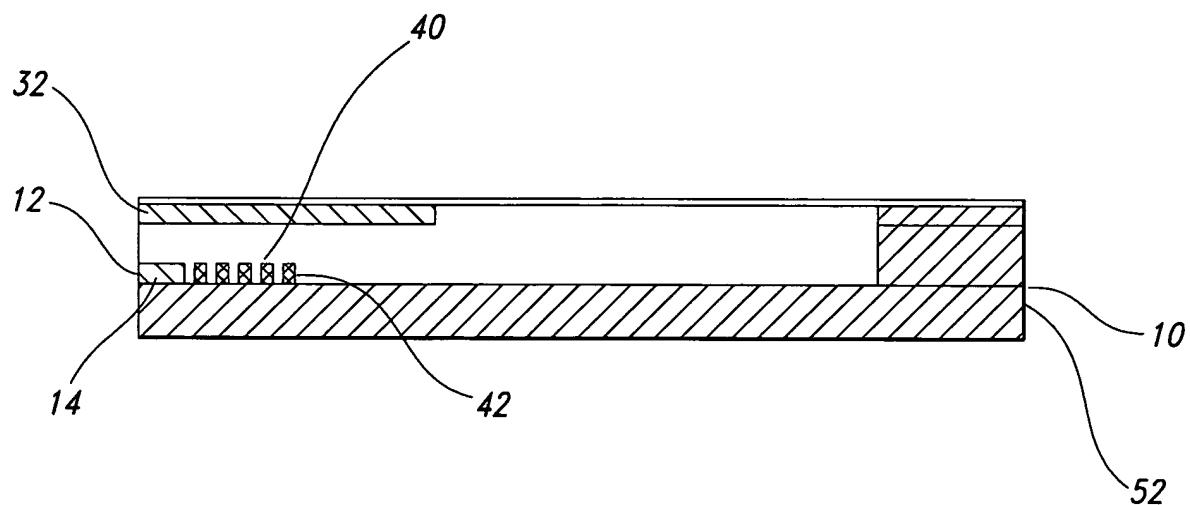


FIG. 6

+

Replacement Sheet

7/39

+

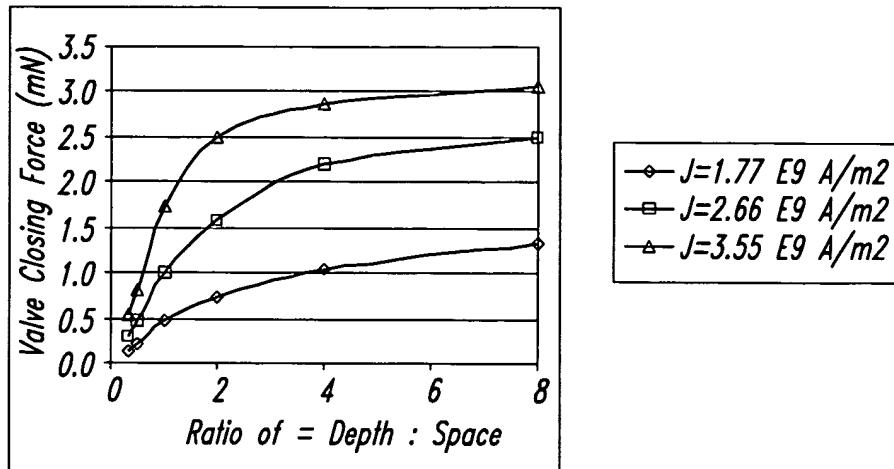


FIG. 7

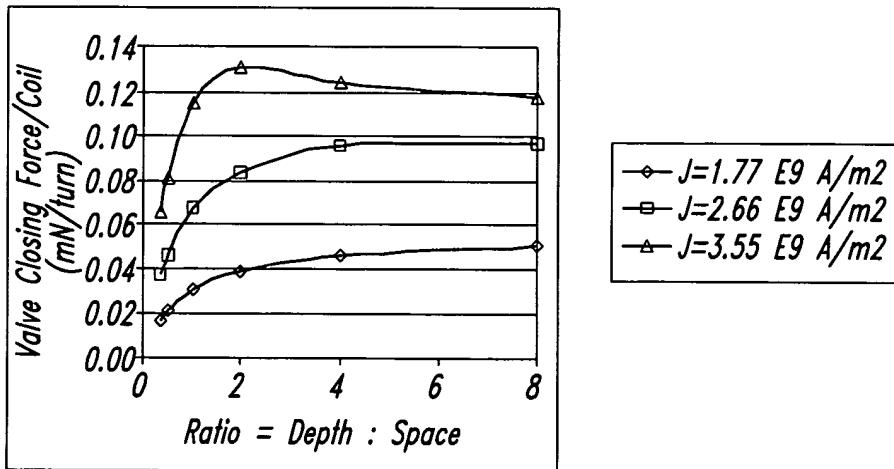


FIG. 8

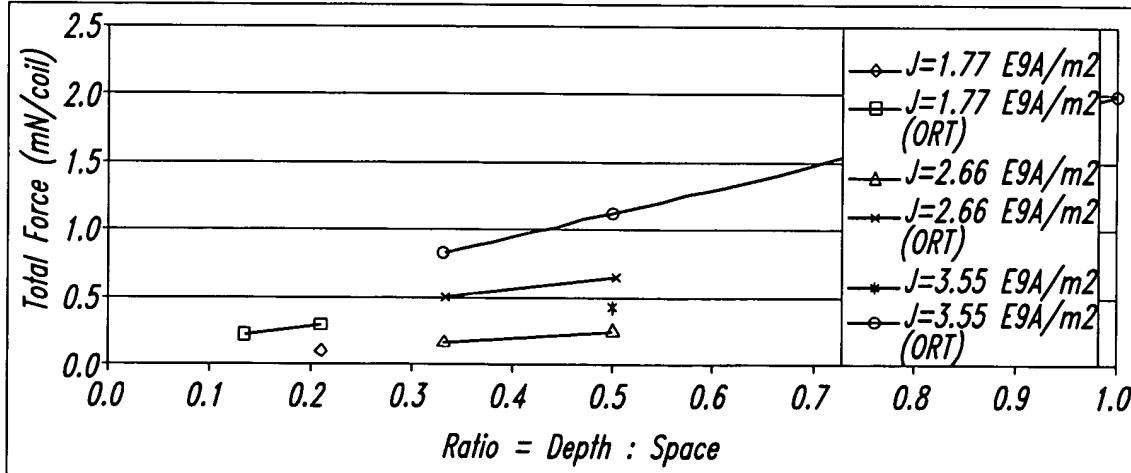


FIG. 9

+

Replacement Sheet

8/39

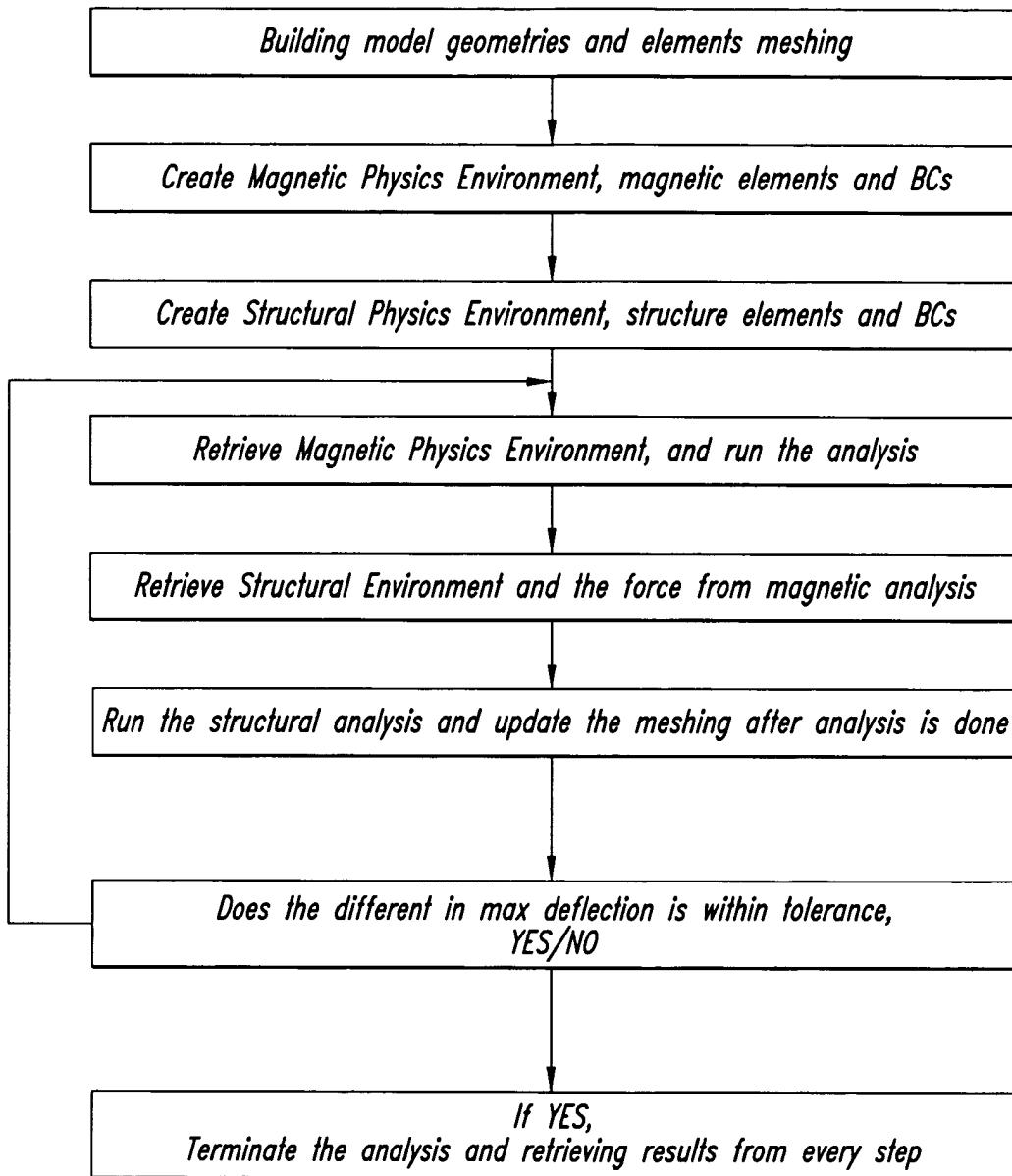


FIG. 10

Replacement Sheet

9/39

+

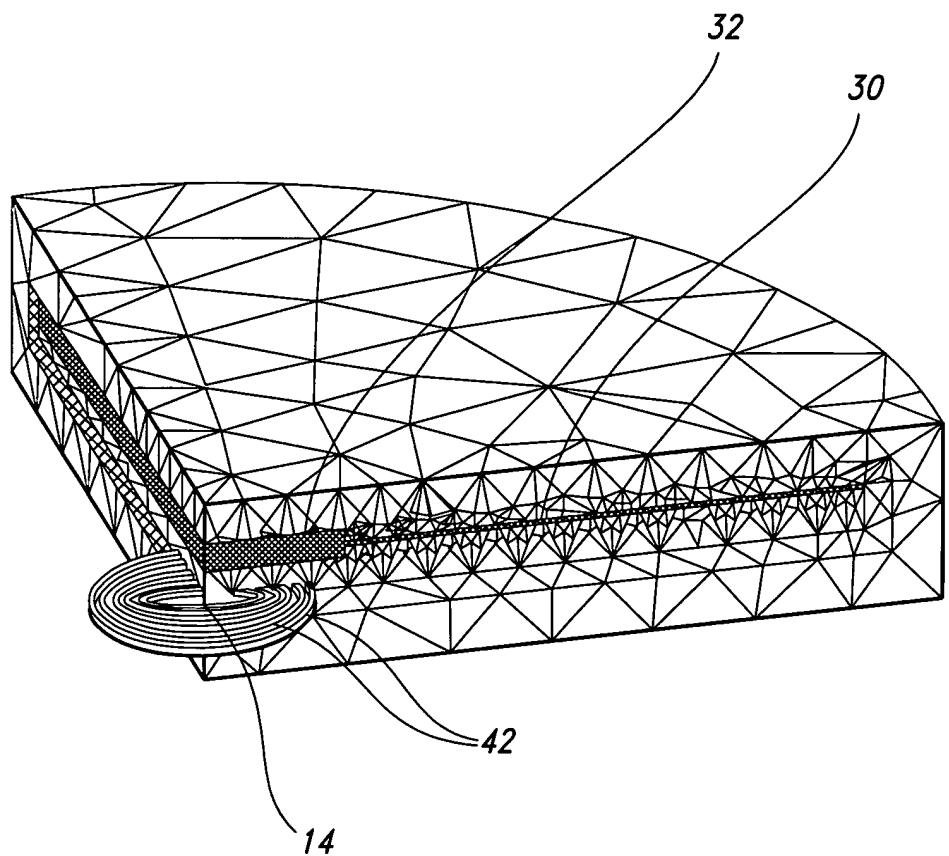


FIG. 11

+

Replacement Sheet

10/39

+

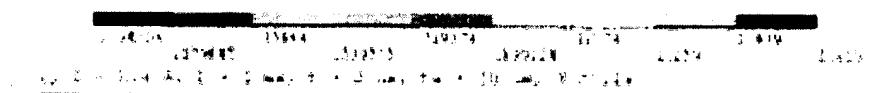


FIG. 12A

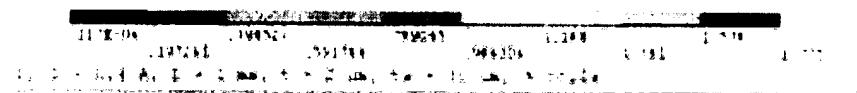
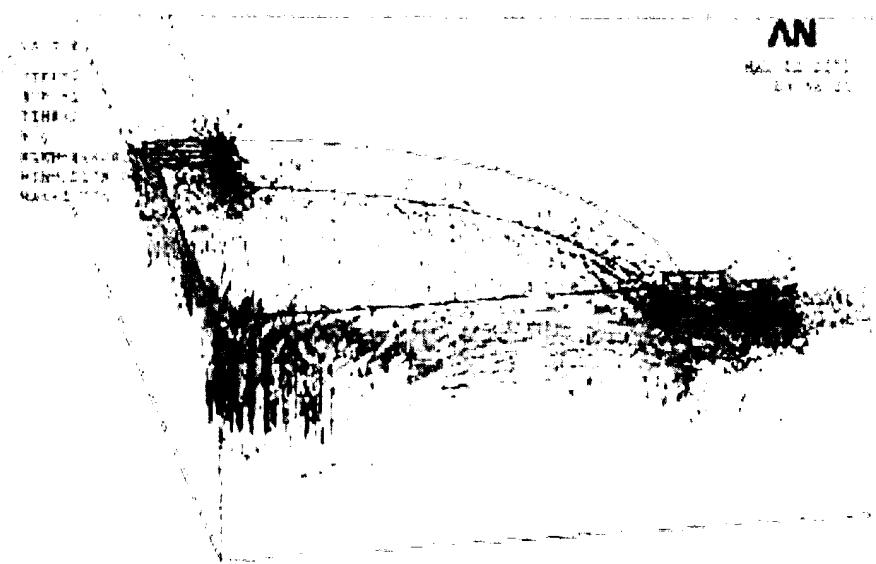


FIG. 12B

+

Replacement Sheet

11/39

+

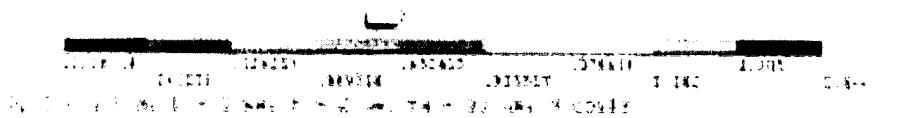
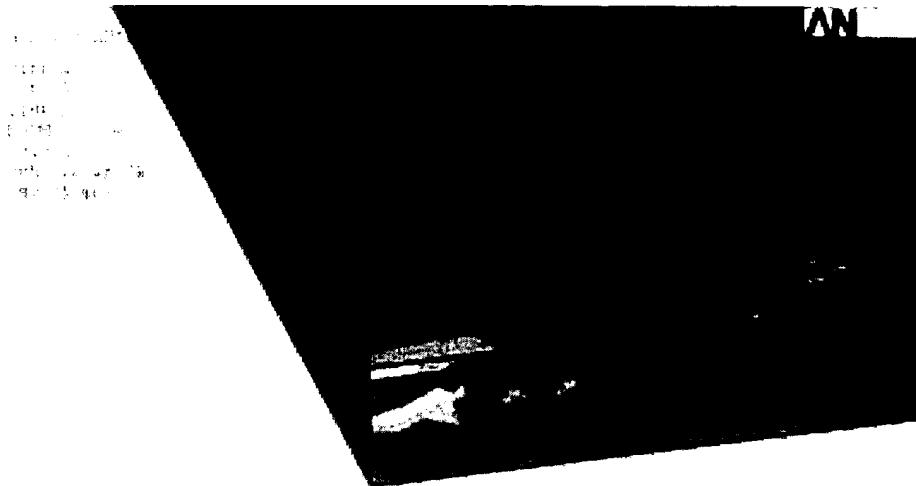


FIG. 13A

AN

100.00 100.00
100.00 100.00

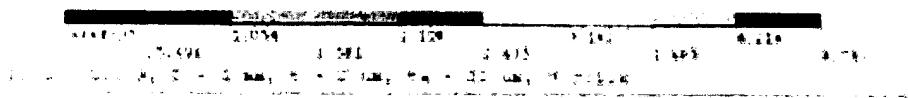
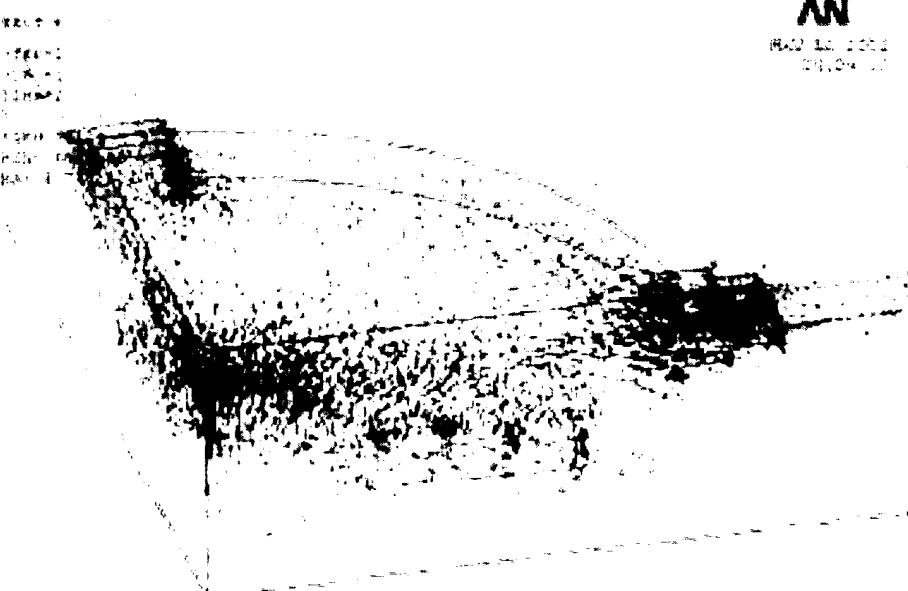


FIG. 13B

+

Replacement Sheet

12/39

AN

+

FIG. 14A



AN

FIG. 14B



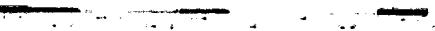
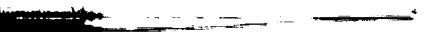
AN

FIG. 14C



AN

FIG. 14D



+

Replacement Sheet

+

13/39

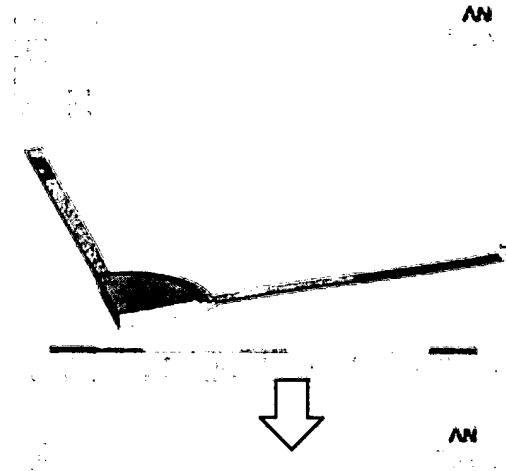


FIG. 15A

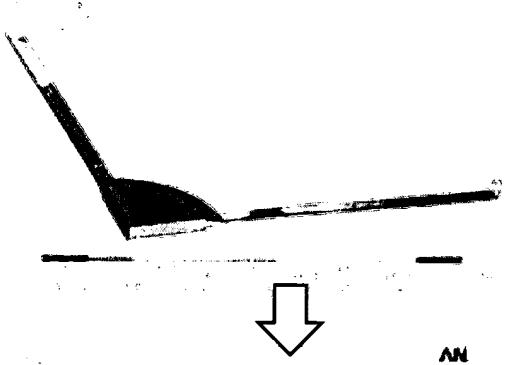


FIG. 15B

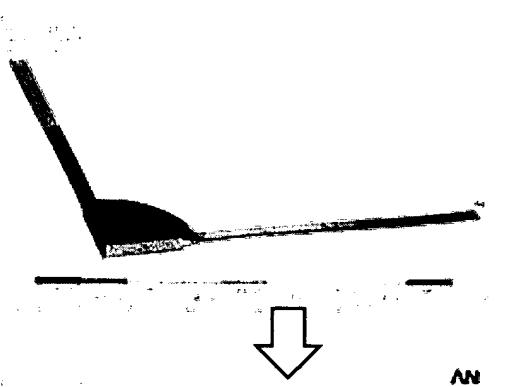


FIG. 15C

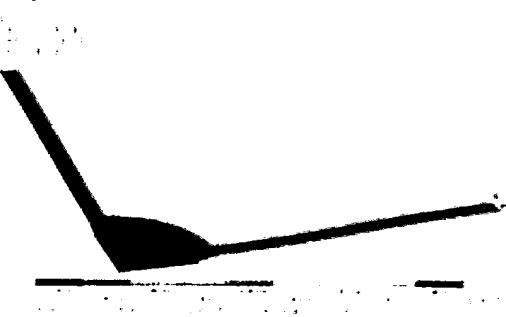


FIG. 15D

Replacement Sheet

14/39

+

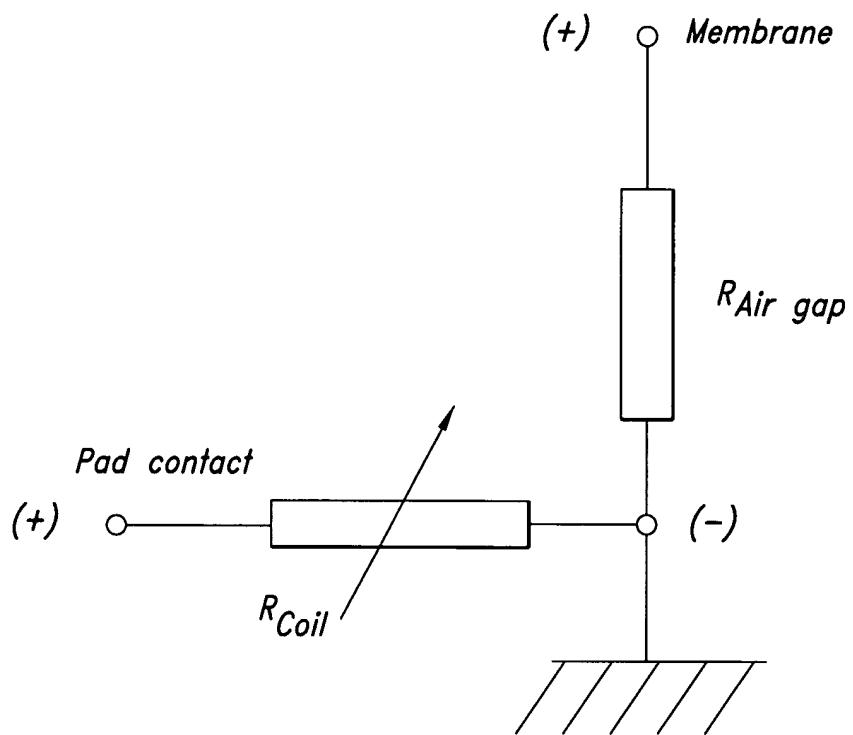


FIG. 16

+

Replacement Sheet

15/39

+

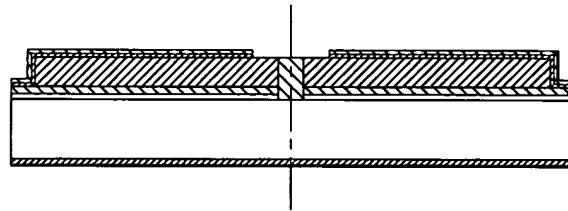


FIG. 17A

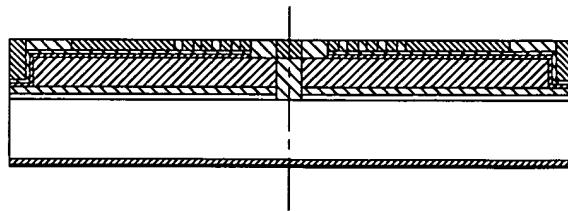


FIG. 17B

+

Replacement Sheet

+

16/39

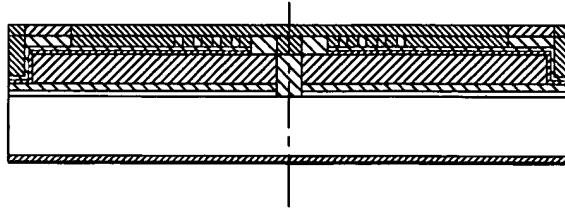


FIG. 17C

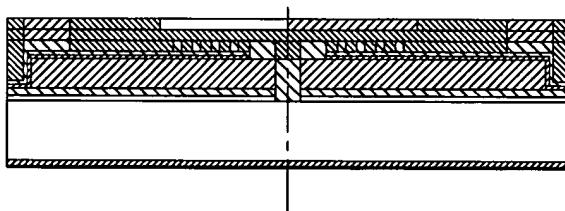


FIG. 17D

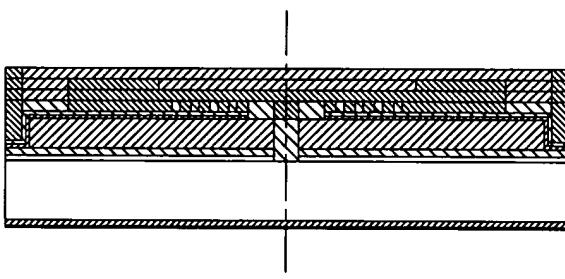


FIG. 17E

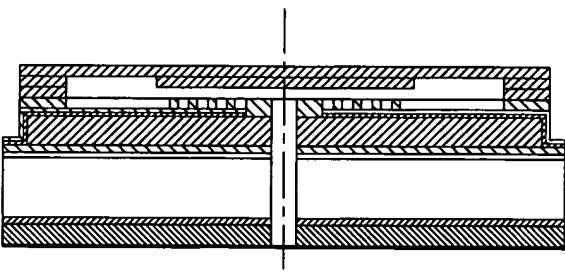


FIG. 17F

+

Replacement Sheet

17/39

+

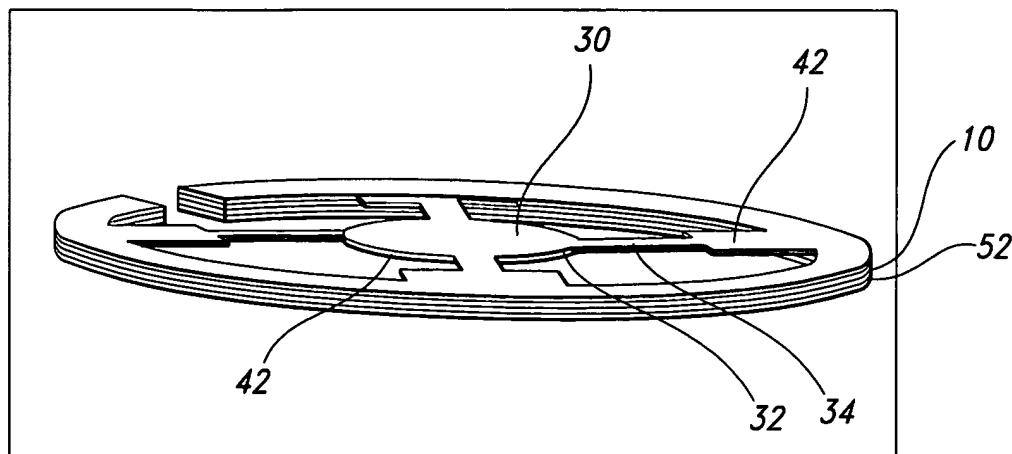


FIG. 18

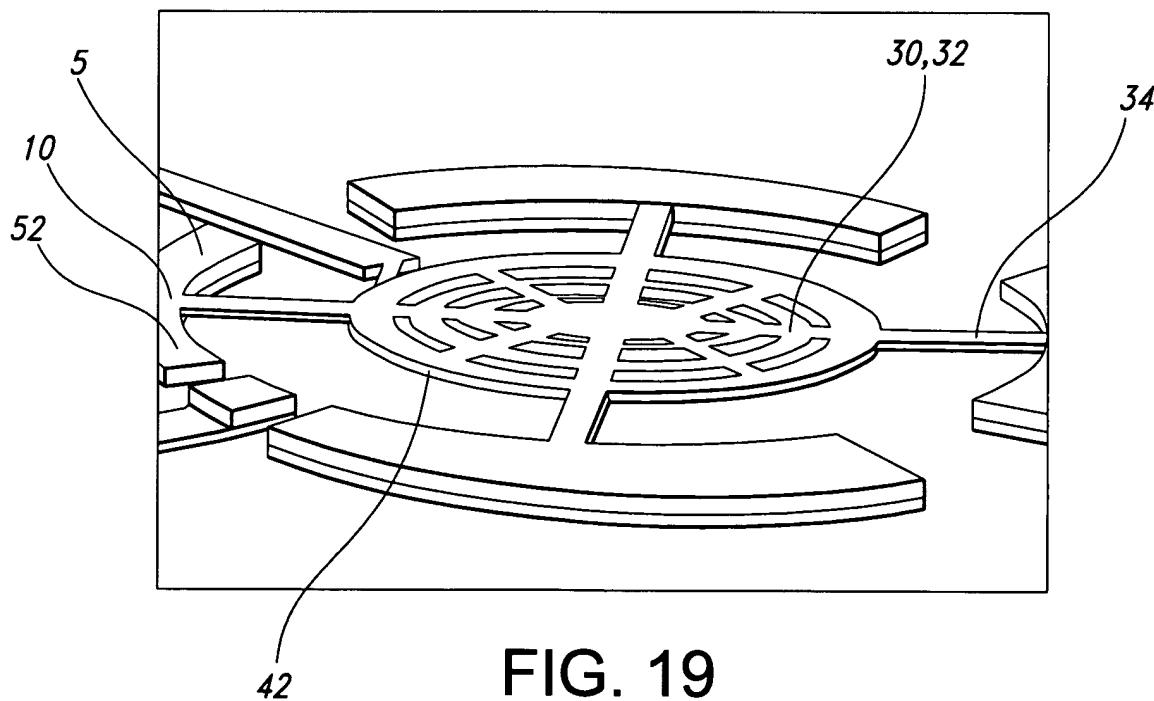


FIG. 19

+

Replacement Sheet

18/39

+

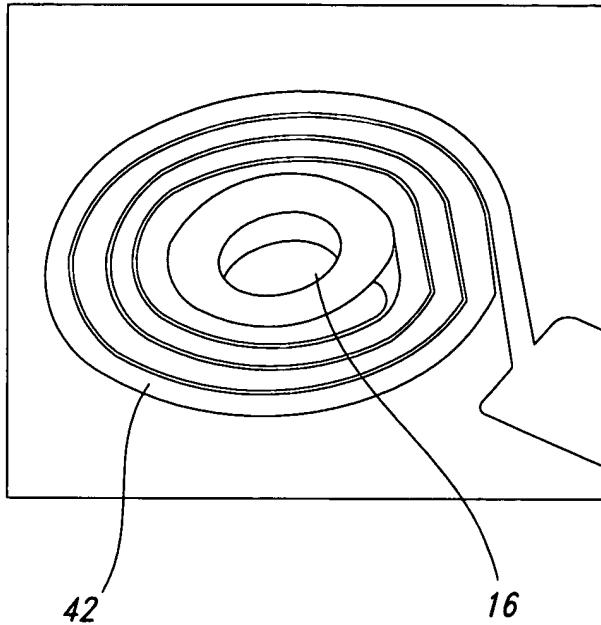


FIG. 20

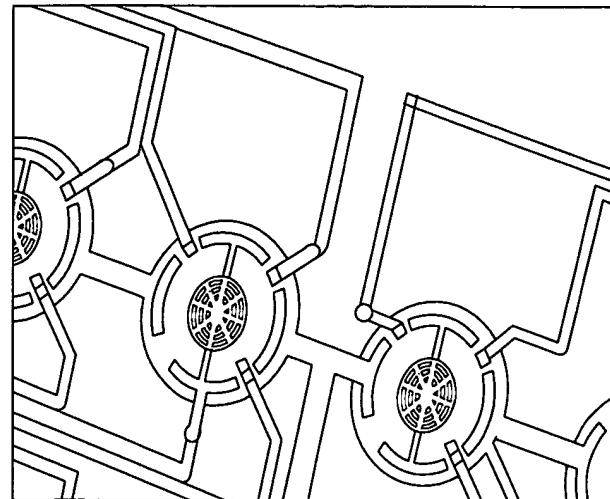


FIG. 21

Force Vs Deflection
300 μm centered dome membrane, with overall dimensions 1000 μm
(4 supported legs, 50 μm width)

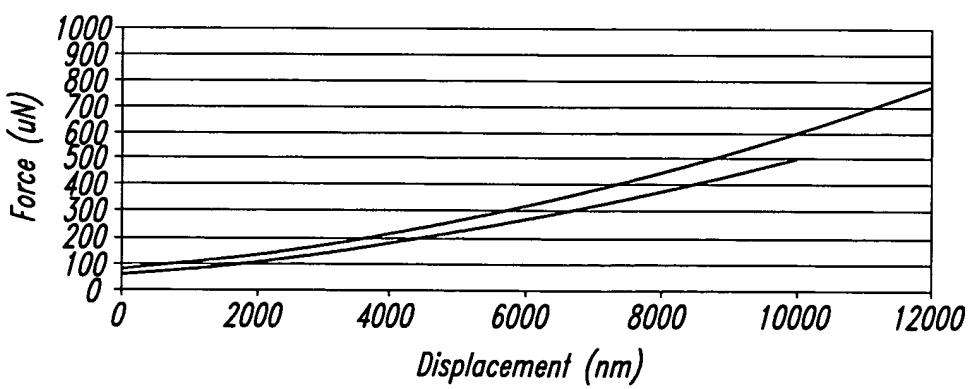


FIG. 22

+

Replacement Sheet

+

19/39

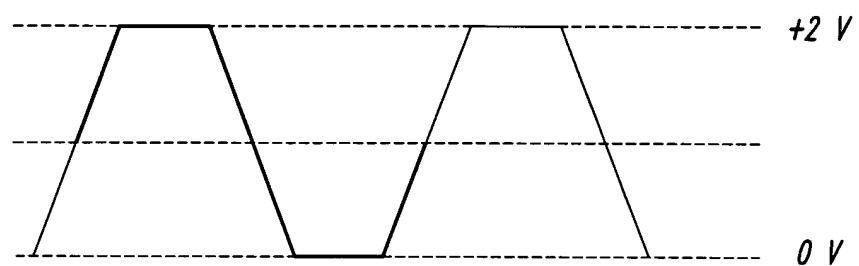


FIG. 23

+

Replacement Sheet

20/39

+

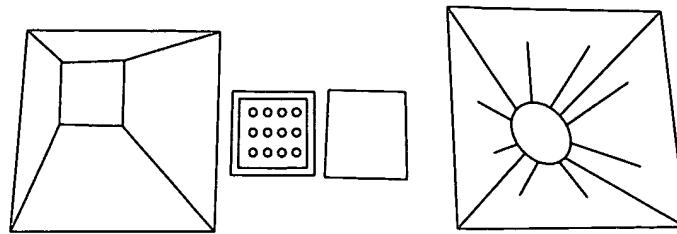


FIG. 24A

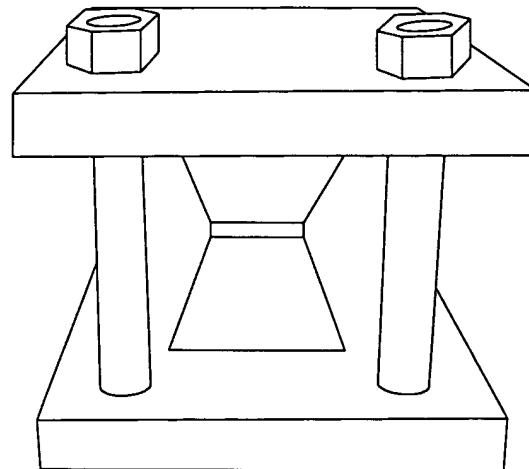


FIG. 24B

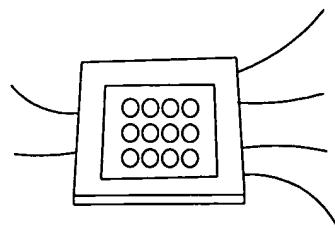


FIG. 24C

+

Replacement Sheet

21/39

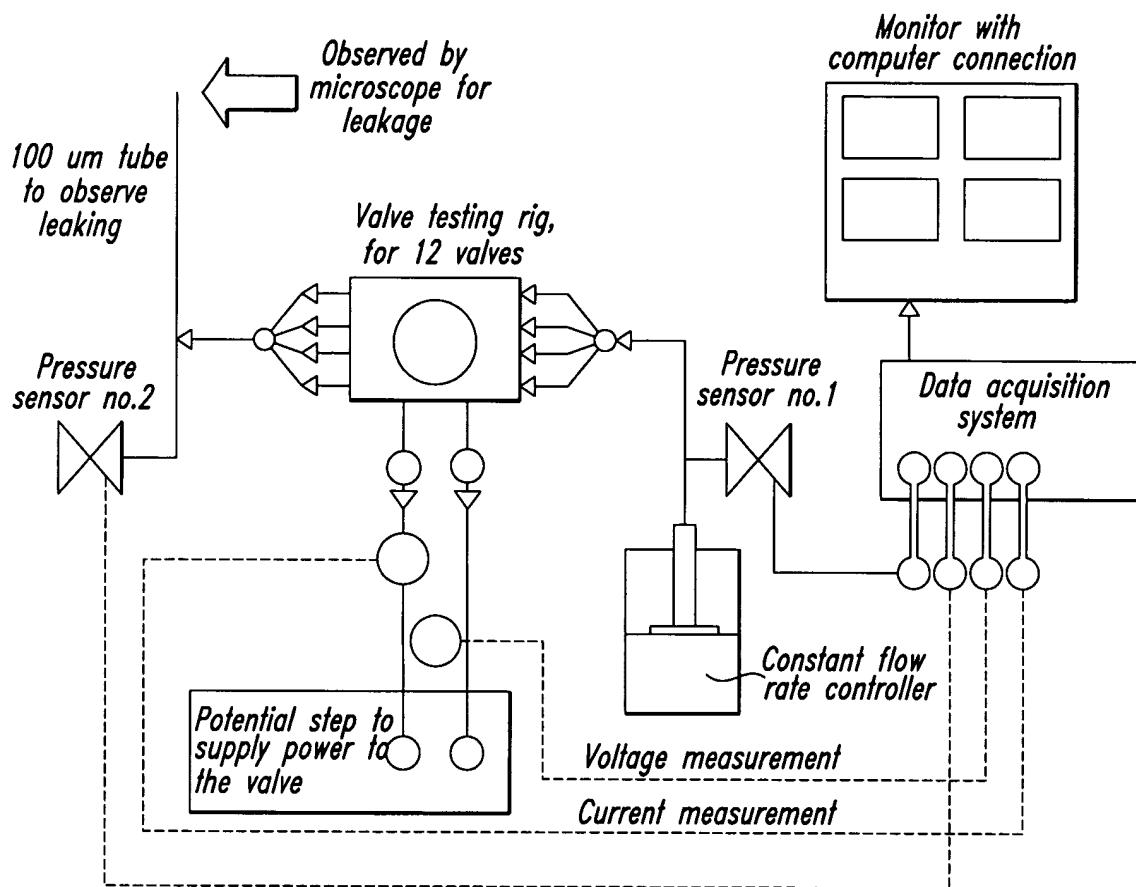


FIG. 25

Replacement Sheet

22/39

+

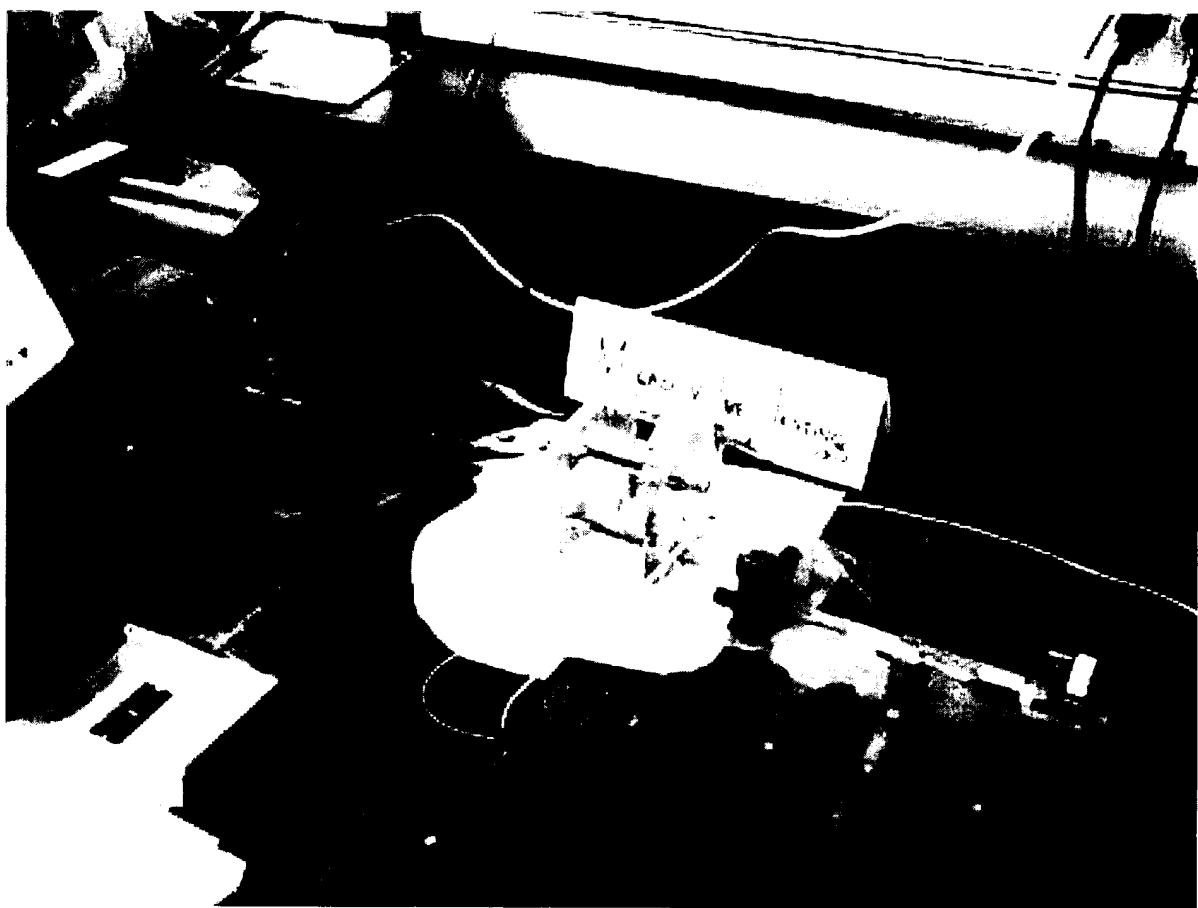


FIG. 26

+

Replacement Sheet

23/39

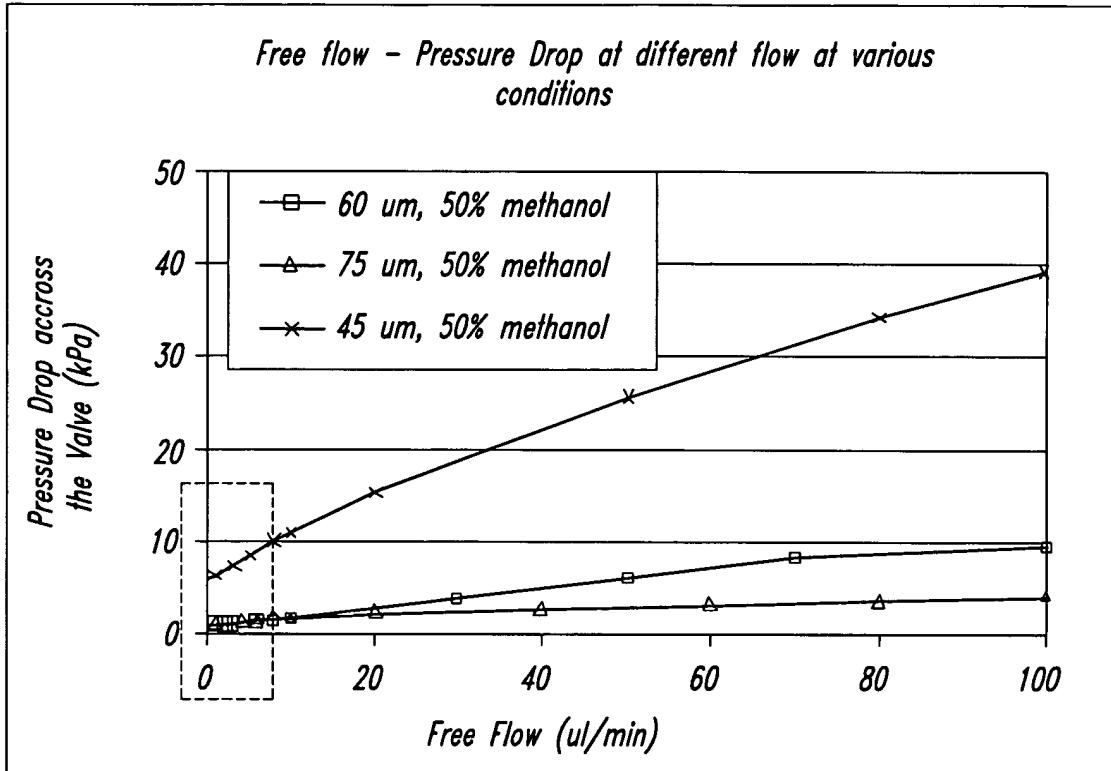


FIG. 27

Replacement Sheet

24/39

+

Testing in the valve actuation; The free flow is 1 $\mu\text{l}/\text{min}$ at pressure drop is 0.65 kPa; Corrugated Membrane with 4 parallel-spring-legs; Orifice diameter is 60 μm ; Coil resistance: 3.1 ohm; Voltage applied for actuation: 1.96 V

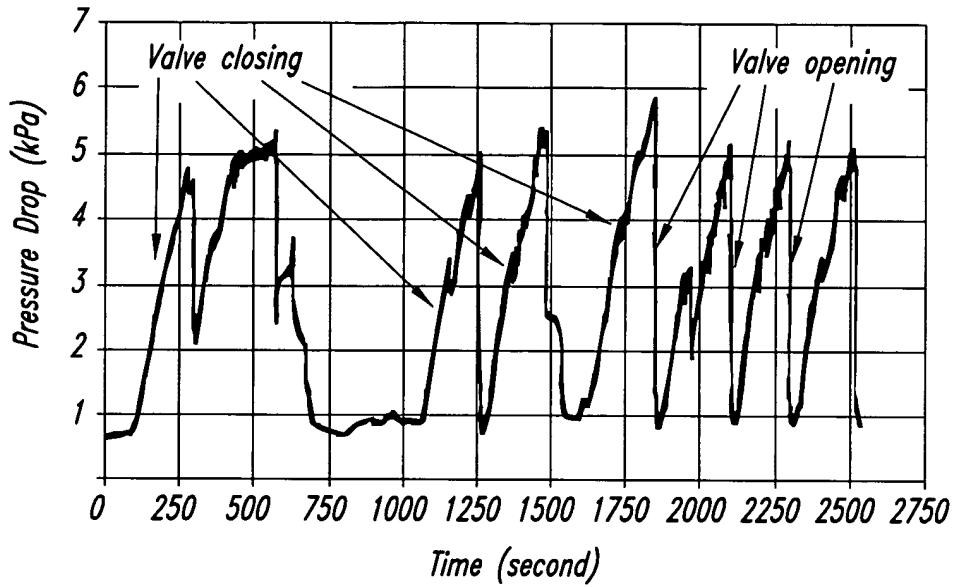


FIG. 28

+

Replacement Sheet

25/39

+

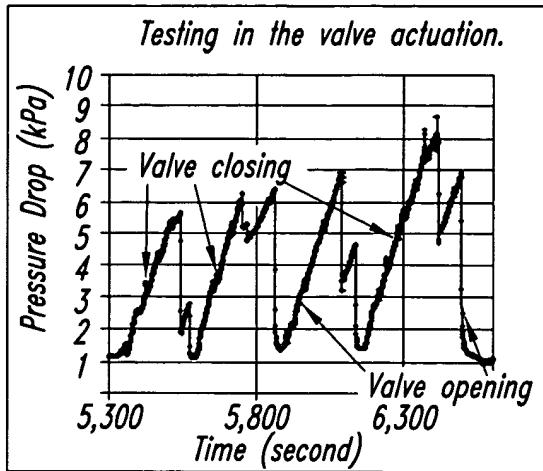


FIG. 29

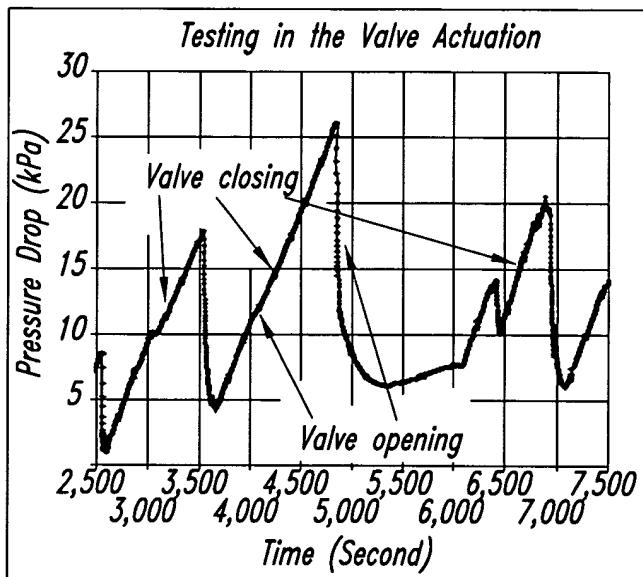


FIG. 30

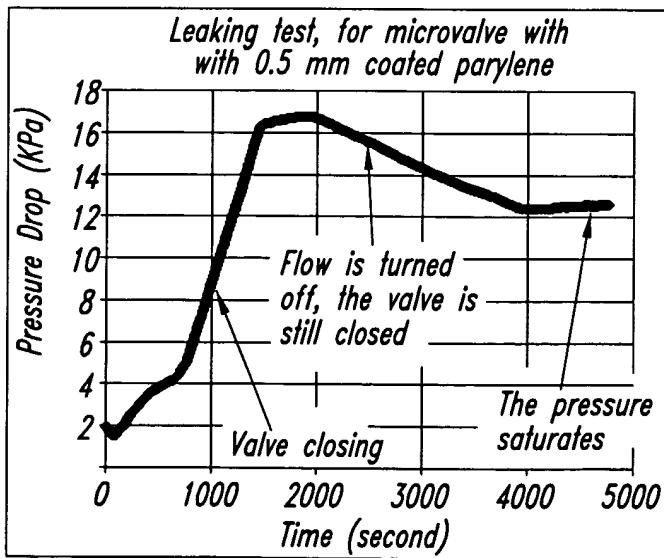


FIG. 31

+

Replacement Sheet

26/39

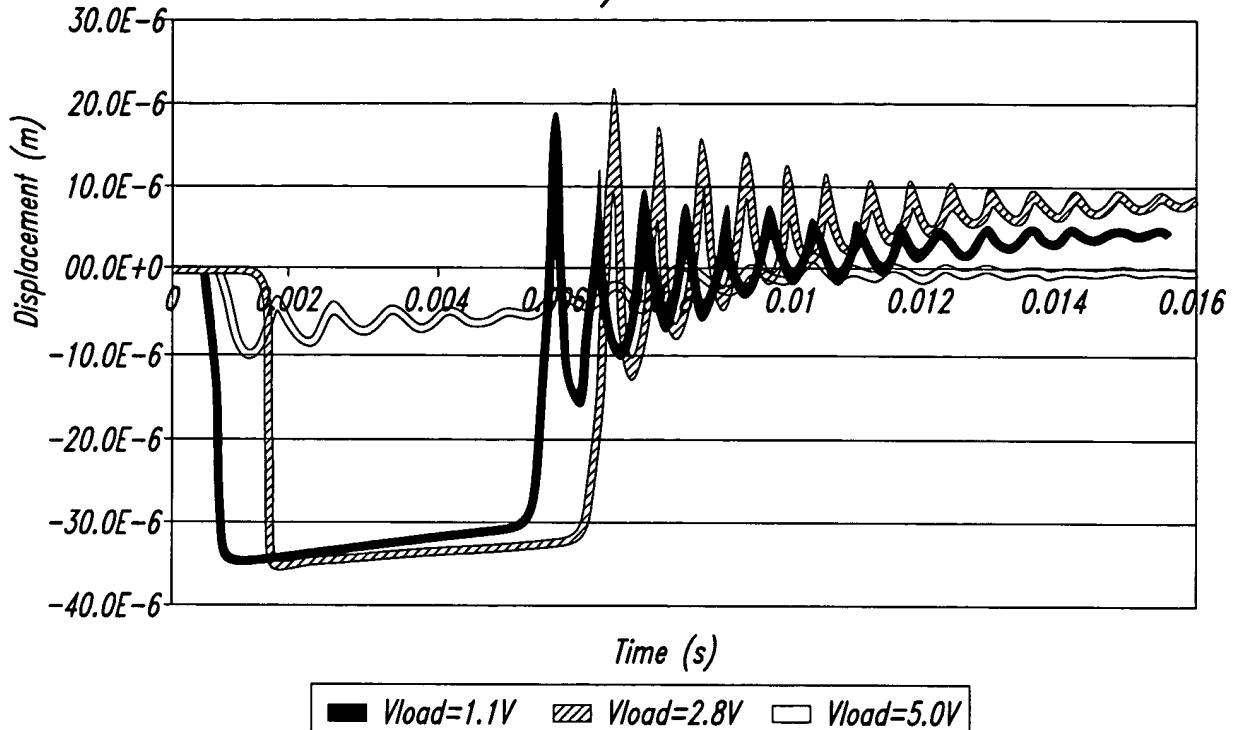


FIG. 32

Sample of responses for varying V_{load} values with $f_b = 1\text{kHz}$

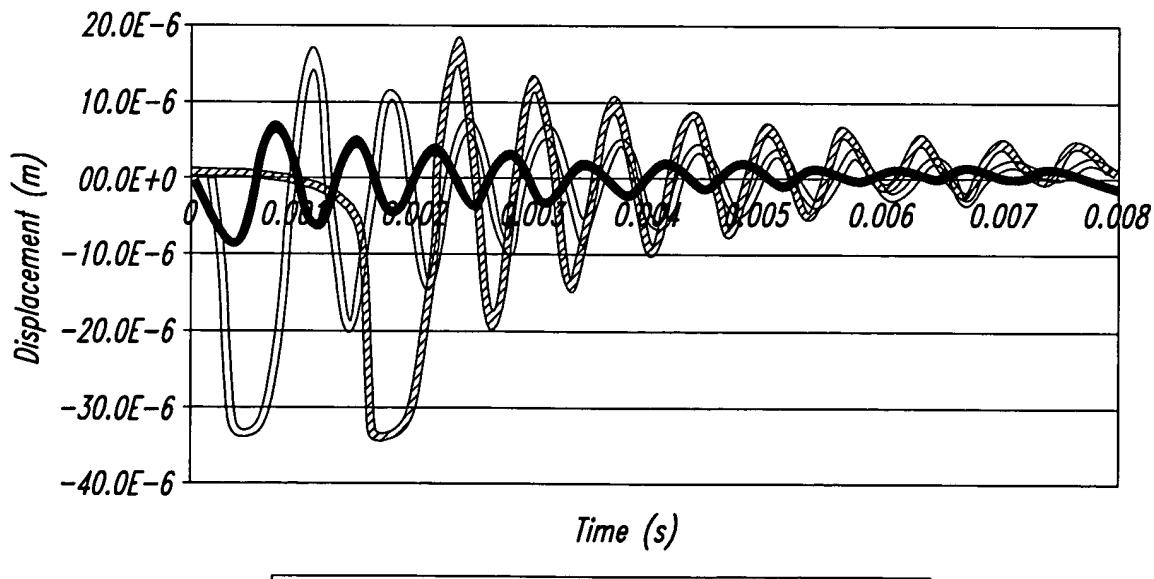


FIG. 33

Replacement Sheet

27/39

Velocity and Displacement of Microvalve
 $f_b = 1\text{kHz}$; $V_{load} = 3.28V$

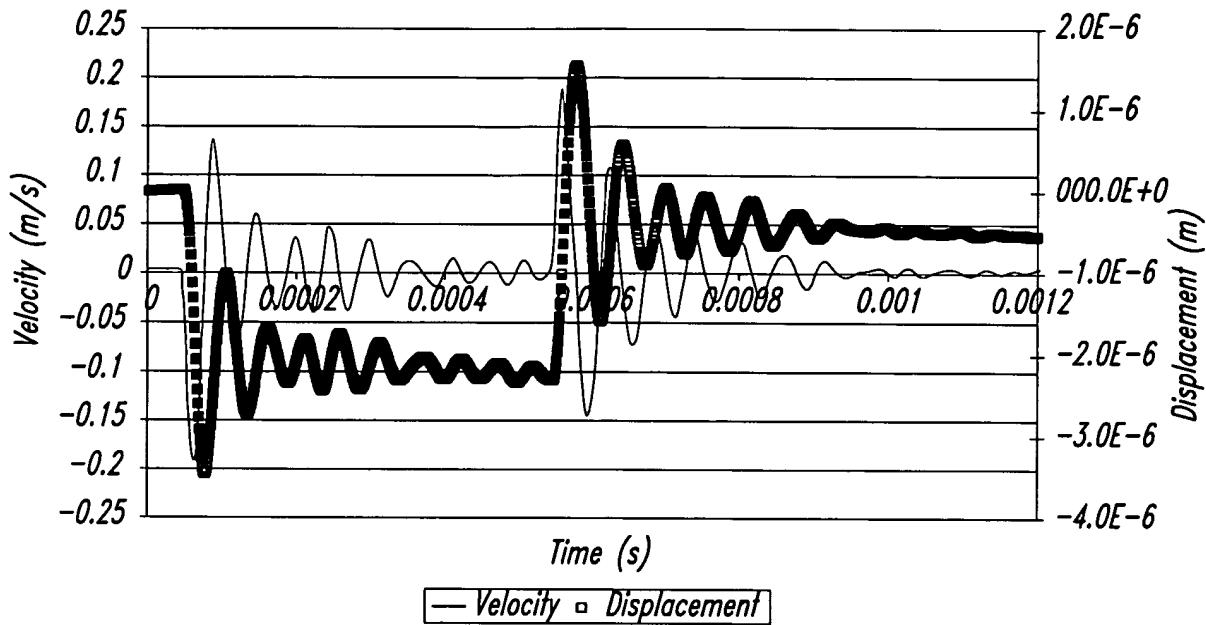


FIG. 34

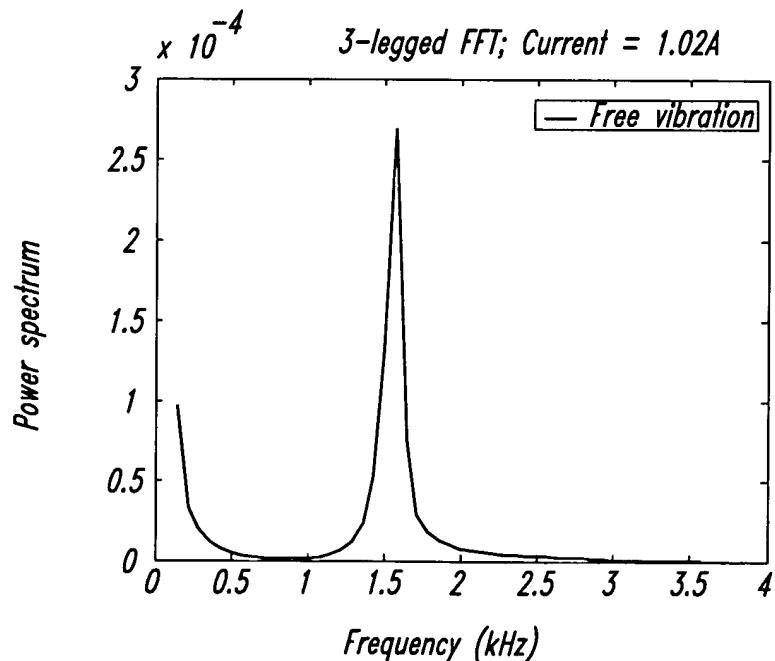


FIG. 35

Replacement Sheet

+

28/39
Experimental Response

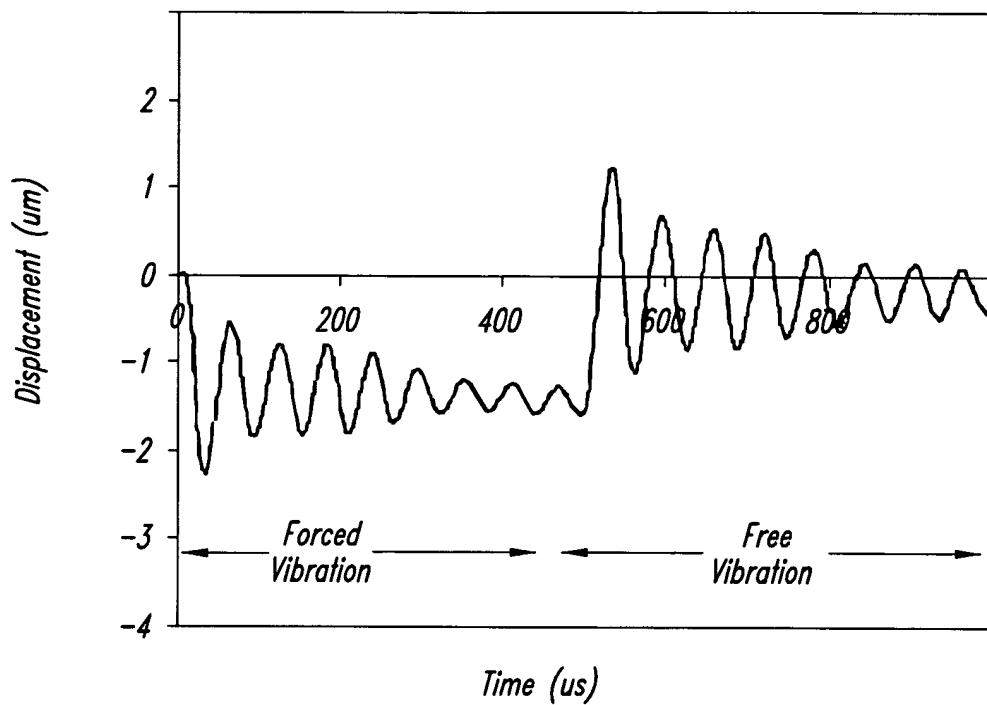


FIG. 36

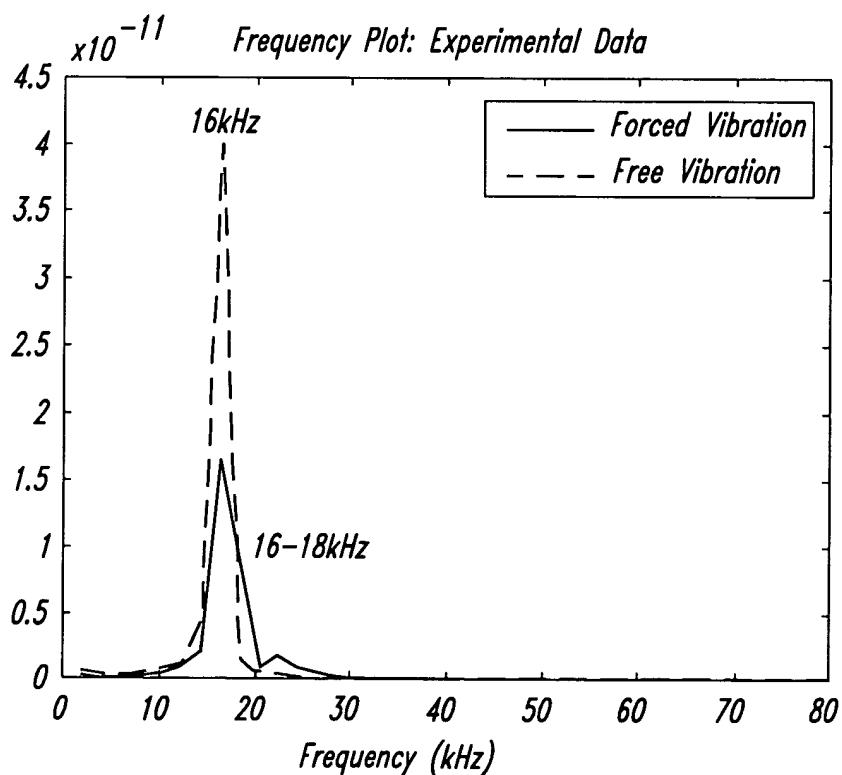


FIG. 37

+

Replacement Sheet

+

29/39

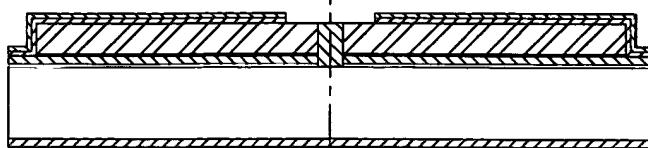


FIG. 38A

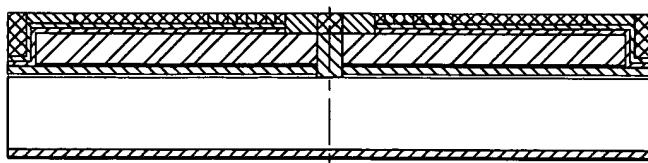


FIG. 38B

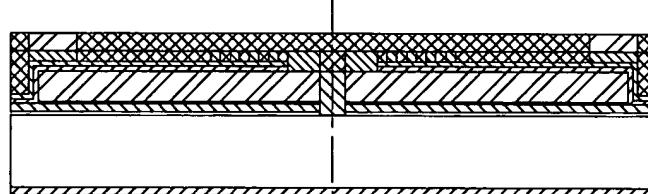


FIG. 38C

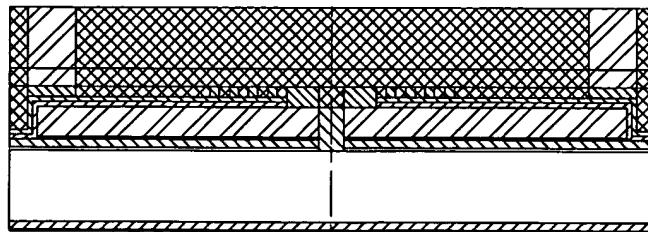
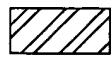


FIG. 38D

Legend:



NiFe



PR, AZ 4620



SiO₂



Permanent Magnet



Cu

+

Replacement Sheet

+

30/39

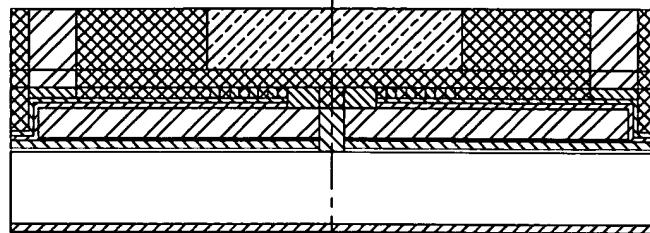


FIG. 38E

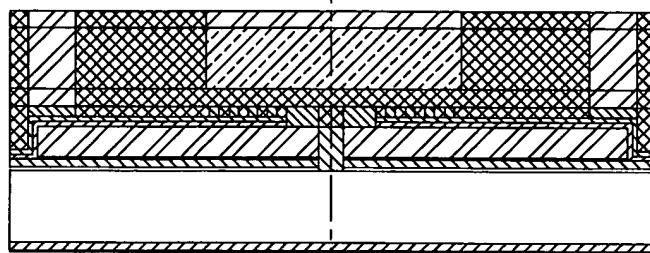


FIG. 38F

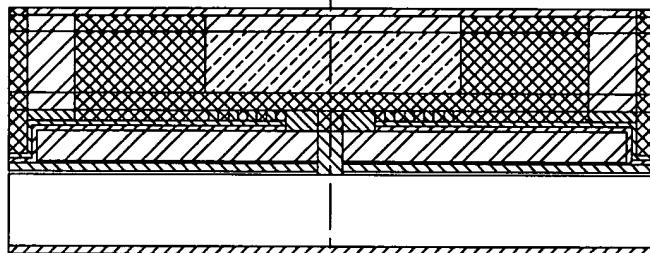


FIG. 38G

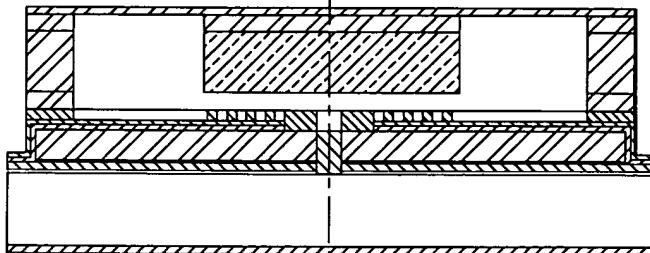


FIG. 38H

Legend:



NiFe



PR, AZ 4620



SiO₂



Permanent Magnet



Cu

+

Replacement Sheet

31/39

+

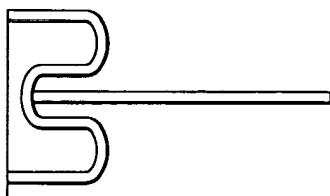


FIG. 39A

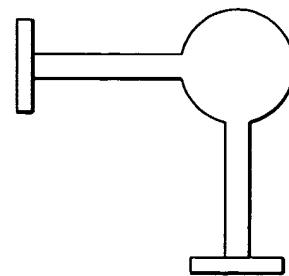


FIG. 40A

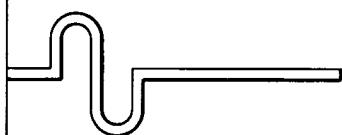


FIG. 39B

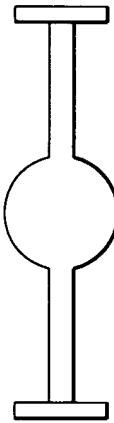


FIG. 40B

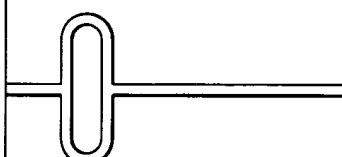


FIG. 39C

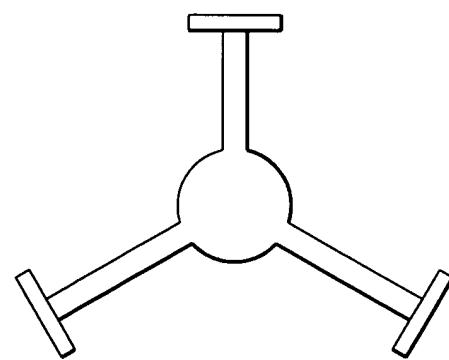


FIG. 40C

+

Replacement Sheet

32/39

+

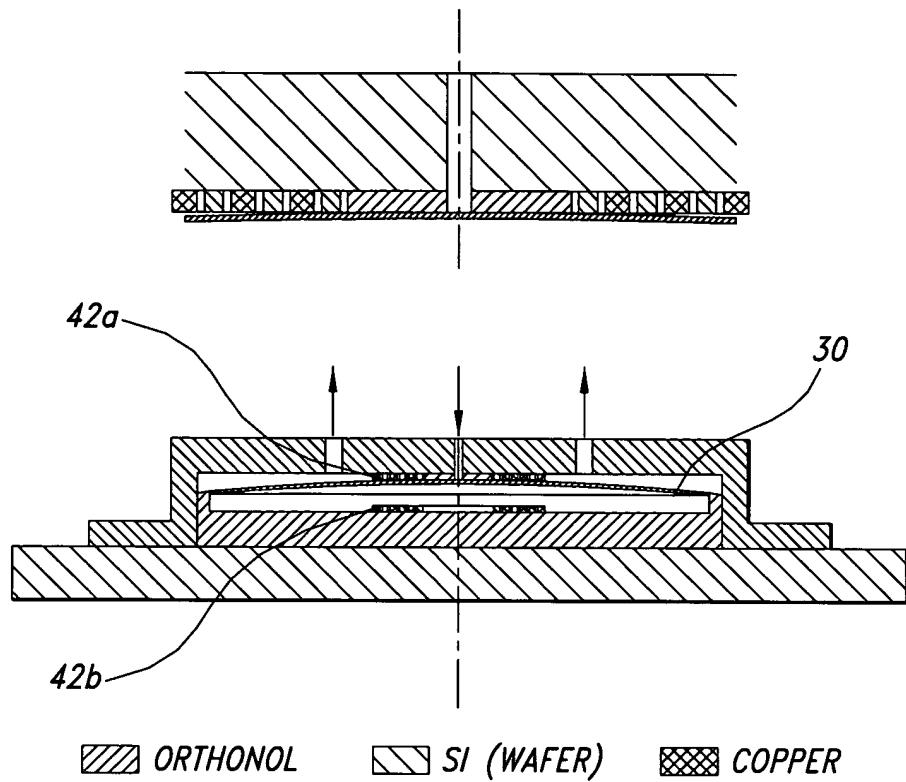


FIG. 41

+

Replacement Sheet

33/39

+

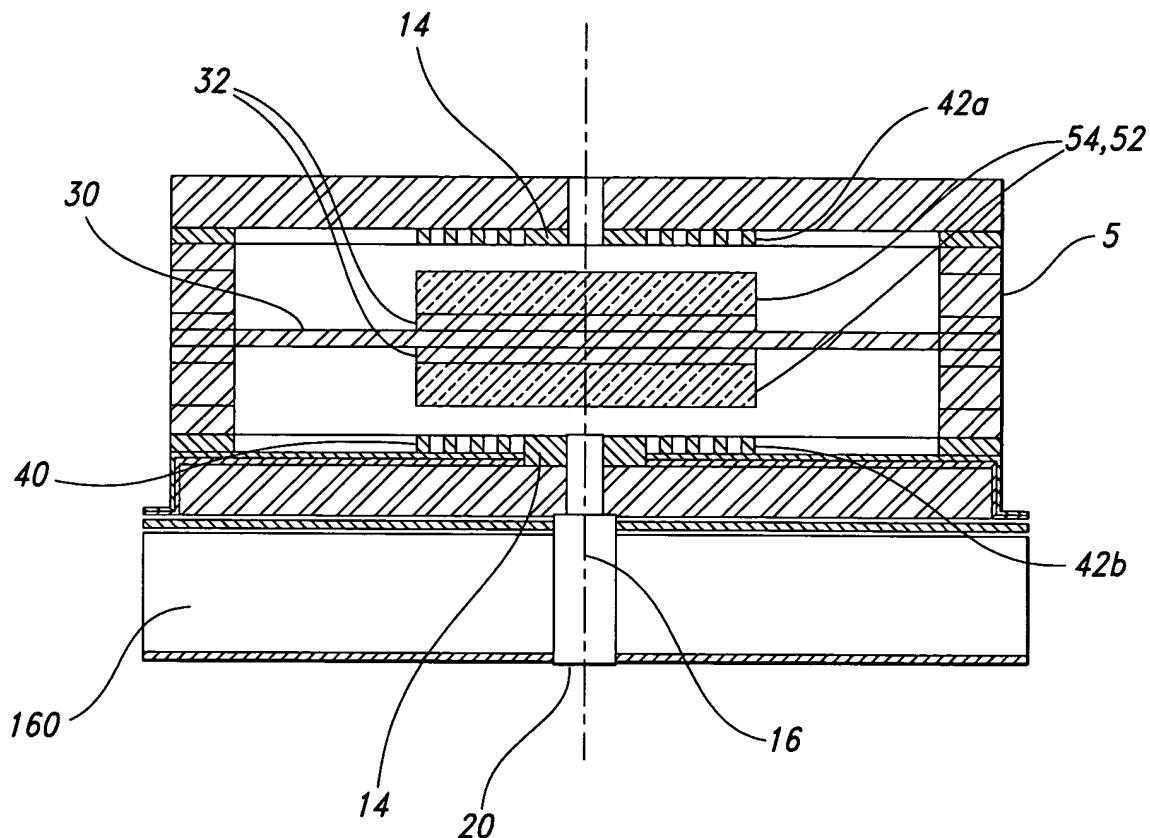


FIG. 42

+

Replacement Sheet

34/39

+

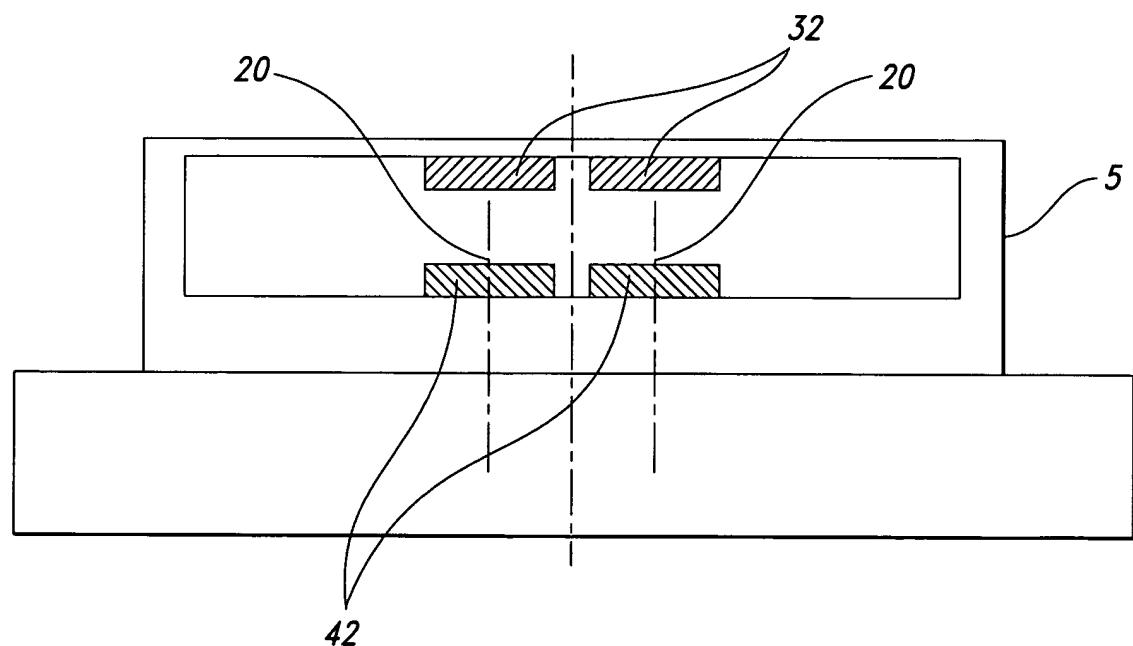
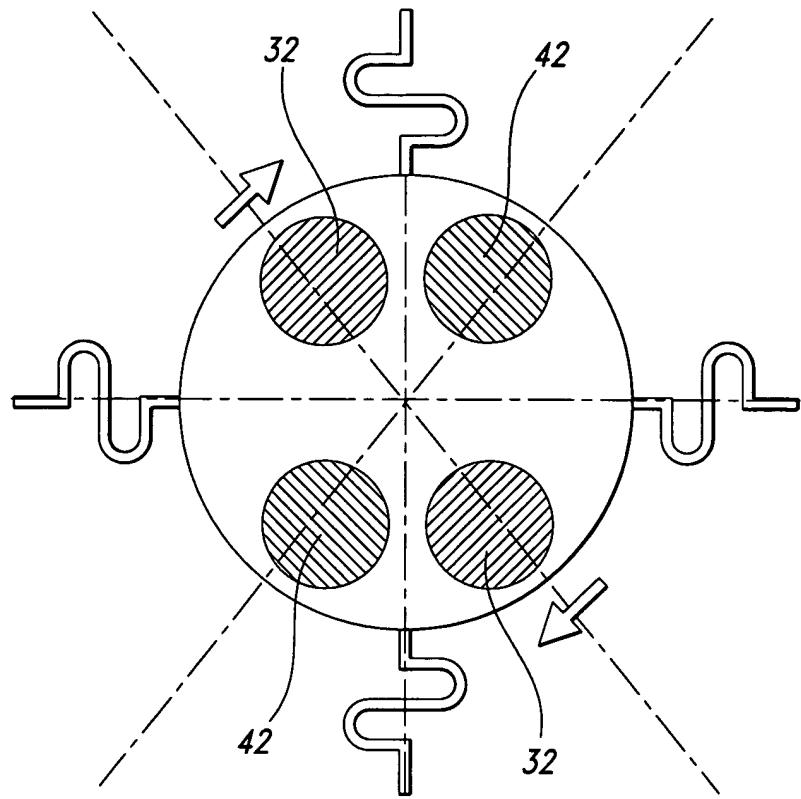


FIG. 43

+

Replacement Sheet
35/39

+

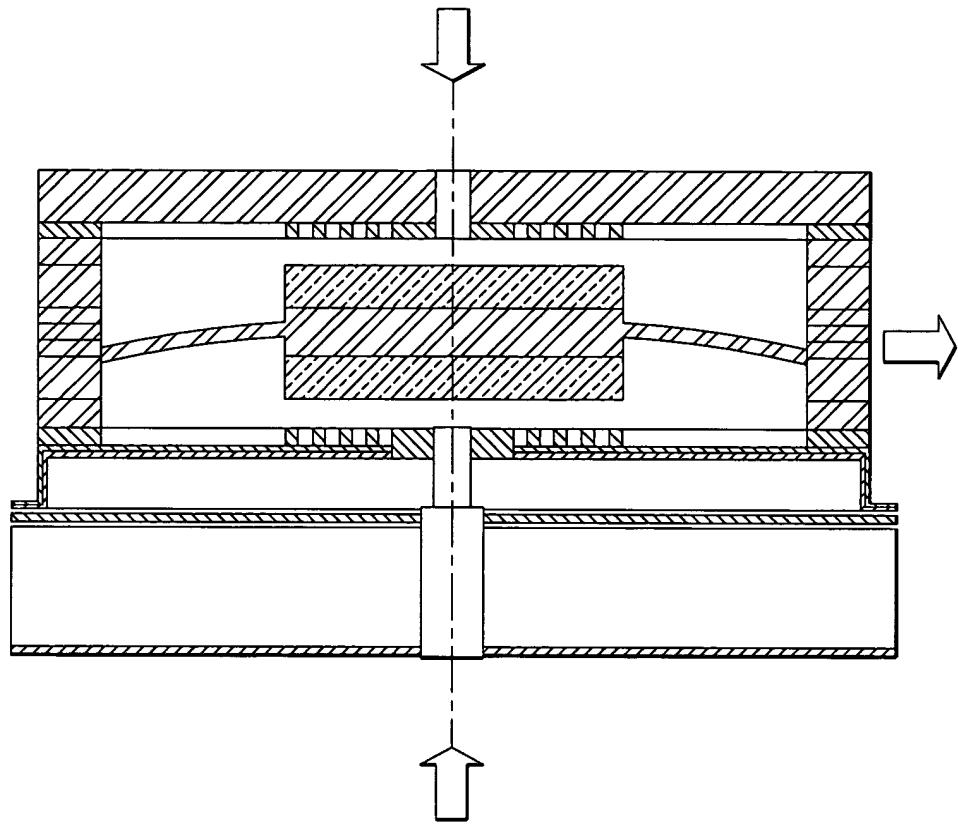


FIG. 44

+

Replacement Sheet

36/39

+

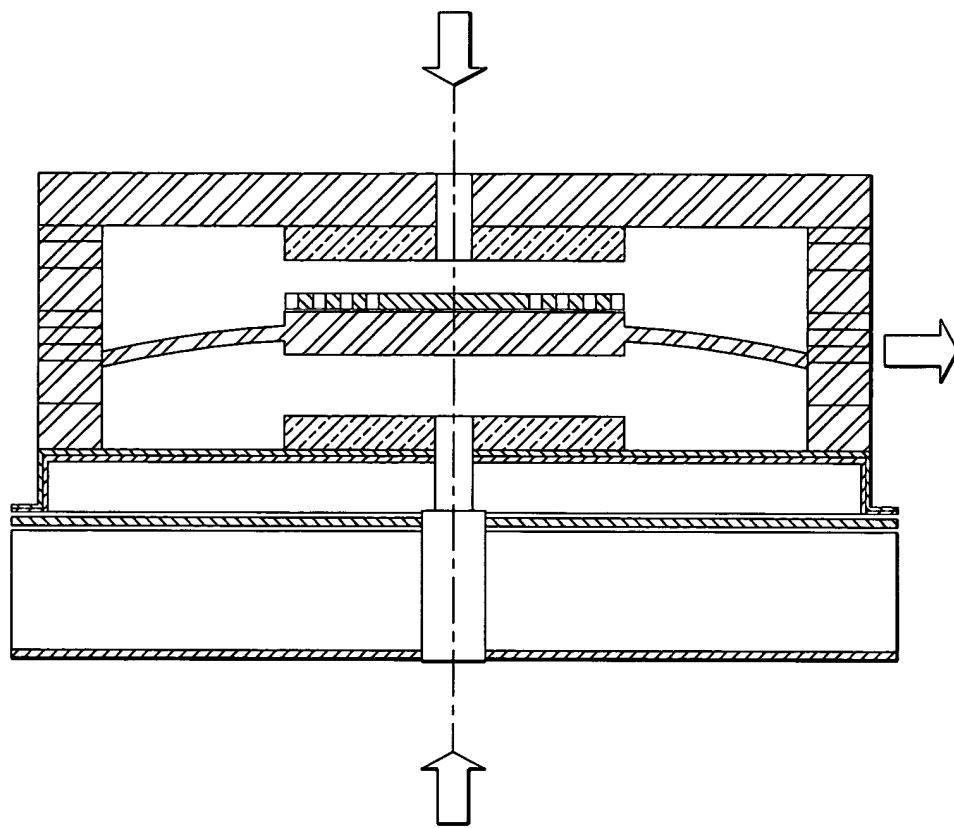


FIG. 45

+

Replacement Sheet
37/39

+

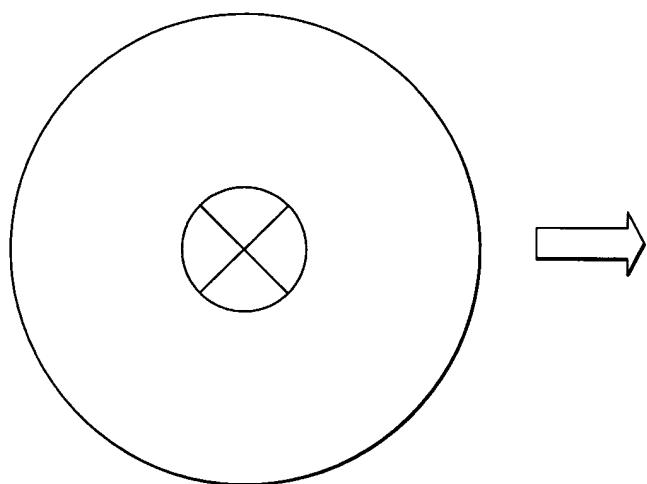
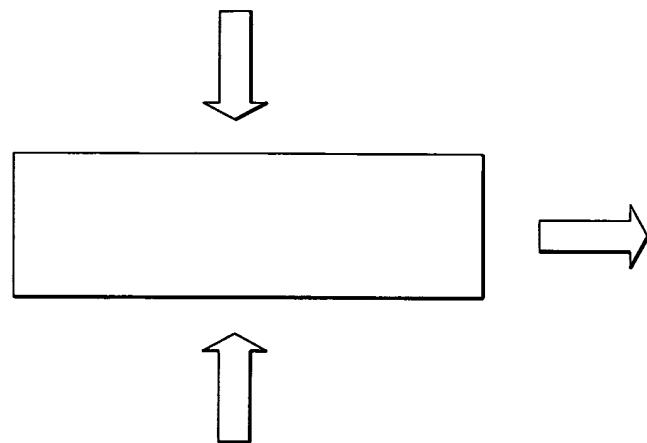


FIG. 46

+

Replacement Sheet
38/39

+

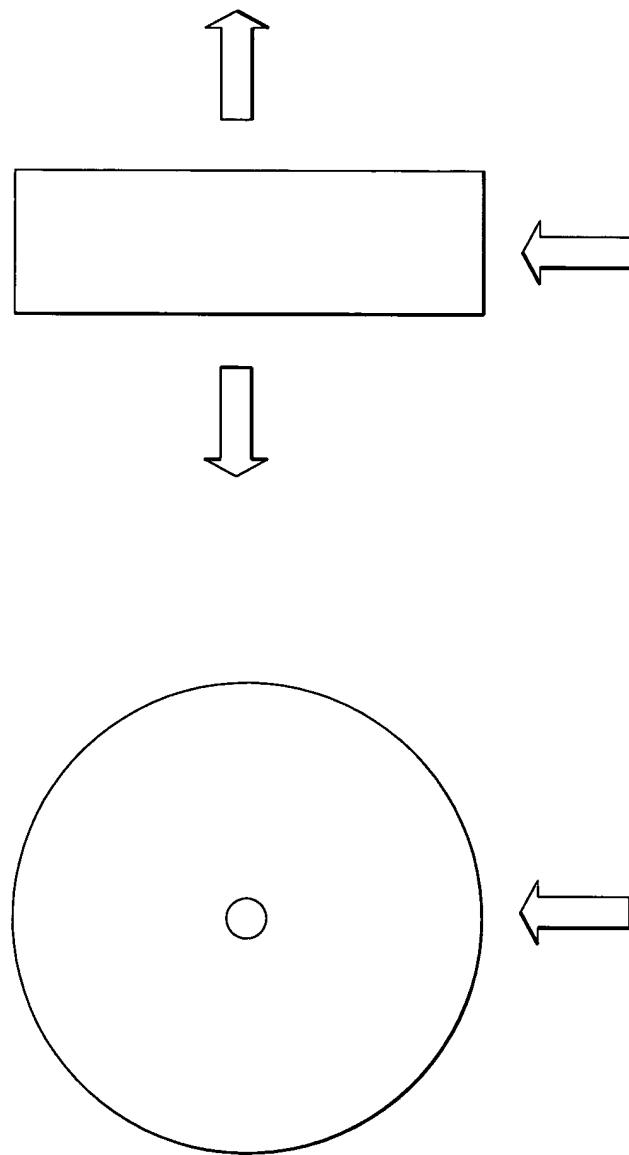


FIG. 47

+

Replacement Sheet

39/39

+

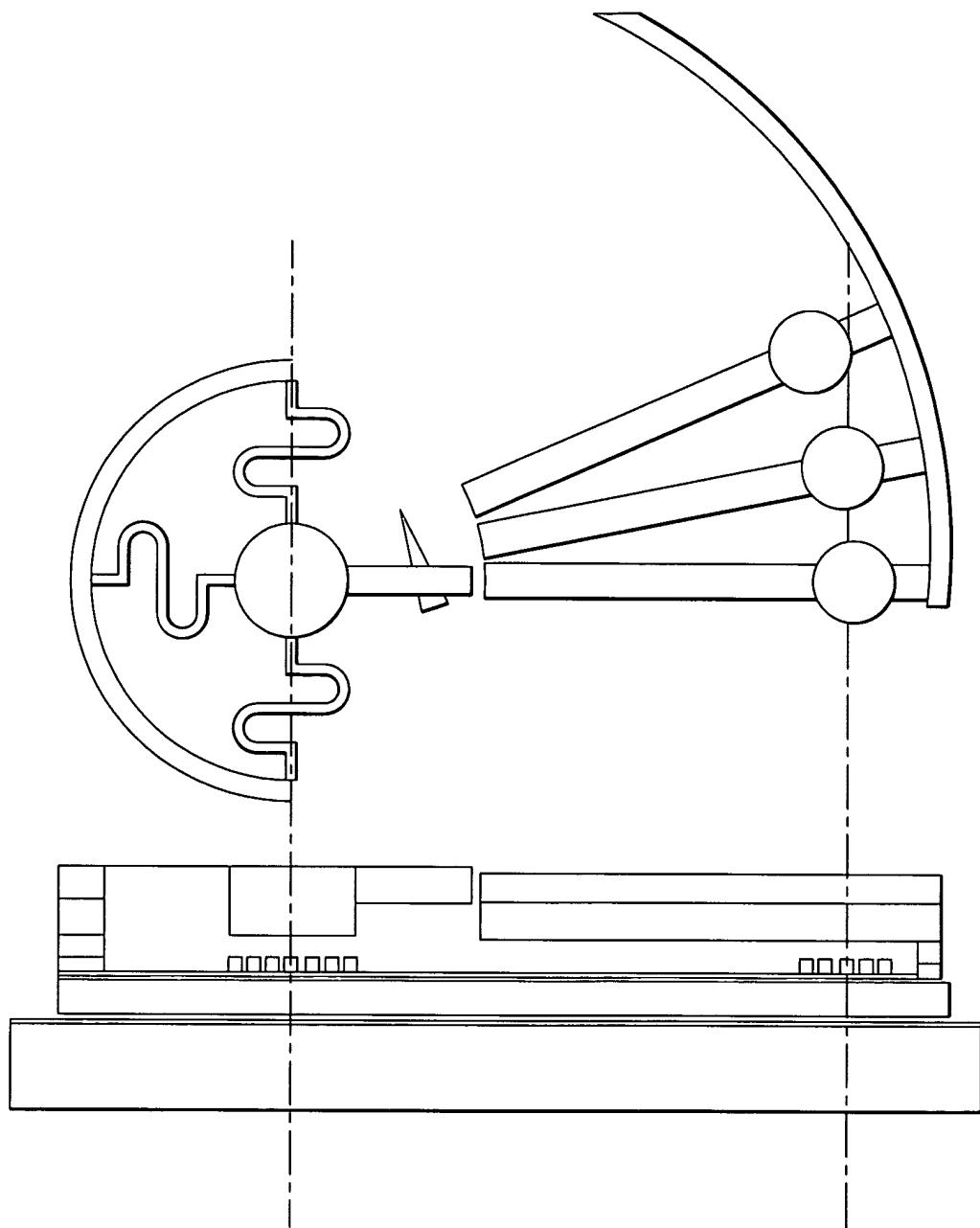


FIG. 48

+